REMARKS

In the Official Action mailed on **January 19, 2005** the Examiner reviewed claims 1-21. The Claims in 1-21 are directed to non-statutory subject matter under 35 U.S.C. §101. Claims 1-21 were rejected under 35 U.S.C. 102(b) as being anticipated by Eldon Hansen's "Global Optimization Using Interval Analysis" (Hansen).

Rejections under 35 U.S.C. §101

Claims 1-21 were rejected because the claimed invention is directed to non-statutory subject matter.

Applicant has amended independent claims 1, 8, and 15 to clarify that the invention relates to a method for improving computational efficiency in solving interval global optimization problem. In practice, interval global optimization problem becomes an "NP-hard" problem, which requires an exponentially increasing amount of computation work, as the number of independent variables increases. The method of applying term consistency to the problem can effectively speed up the computation process by first narrowing or eliminating "large" intervals or boxes before further computation. The results find usefulness in computational intensive tasks such as predicting weather, optimizing design of an aircraft engine. These amendments find supports in page 5, lines 1-18, page 15, lines 10-26, and page 16, lines 23-26.

Applicant has also amended independent claims 1, 8, and 15 to point out that special-purpose hardware (namely, an interval arithmetic unit) as illustrated in FIG. 3, is used to perform interval computations prior to applying term consistency. A system that combines special-purpose interval hardware and term consistency is not an abstract algorithm.

Rejections under 35 U.S.C. §112

Claims 1-21 were rejected because the current case law requires such a rejection if a 101 rejection is given.

Rejections under 35 U.S.C. §112 on claims 1-21 are no longer applicable in consideration of the amendments made to claims 1, 8, and 15 in order to place the claims in condition for allowance in response to 35 U.S.C. §101.

Rejections under 35 U.S.C. §102(b)

Claims 1-21 were rejected as being anticipated by Hansen's "Global Optimization Using Interval Analysis".

Applicant respectfully points out that Hansen teaches using interval analysis for solving the global optimization problem. The main part of the Hansen's book focuses on using interval Newton methods for solving systems of nonlinear equations.

In contrast, the present invention improves computational efficiency in solving an equality constrained interval global optimization problem by applying a novel term consistency method (see FIGs. 6, page 14, lines 16-26, and pages 15-16). Pages 14-16 teach a method for applying term consistency and its associated benefits by explaining the theory and providing example. It illustrates how a box $\boldsymbol{X}$ can be sufficiently narrowed down or eliminated at the beginning of the computation for violating the set of equality constraints. This is important because the smaller the interval or the box $\boldsymbol{X}$, the less amount of computation will be involved. Furthermore, if it is determined that the interval or the box is empty, no further computation is needed. This greatly reduces amount of computational work.

The invention further explains how to incorporate term consistency in solving equality constrained interval global optimization problem (see FIGs. 7A-7E, page 14, lines 16-26, and pages 17-25). As mentioned in page 5, lines 1-18, interval global optimization problem becomes an "NP-hard" problem, which

requires an exponentially increasing amount of computation complexity, as the number of independent variables increases. Hence, term consistency can applied to narrow down or eliminate any number of boxes that violate any of the equality constraints in the same fashion as to a single interval or box.

There is nothing within Hansen's "Global Optimization Using Interval Analysis", either explicit or implicit, which suggests computation efficiency in an interval global optimization process can be improved by applying term consistency method.

Accordingly, Applicant has amended independent claims 1, 8, and 15 to clarify that the present invention solves prior interval global optimization problem with improved computational efficiency by applying novel term consistency method. These amendments find supports in page 5, lines 1-18, page 14, lines 16-26, and pages 15-16.

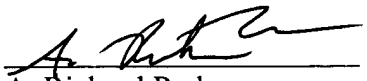
Furthermore, Applicant has amended independent claims 1, 8, and 15 to include limitations from dependent claims 4, 11, and 18, respectively. In so doing, term consistency method has been more clearly defined and its implementation more clearly described. Dependent claims 4, 11, and 15 have been canceled without prejudice.

Hence, Applicant respectfully submits that independent claims 1, 8, and 15 as presently amended are in condition for allowance. Applicant also submits that claims 2-7, which depend upon claim 1, claims 9-14, which depend upon claim 8, and claims 16-21, which depend upon claim 15, are for the same reasons in condition for allowance and for reasons of the unique combinations recited in such claims.

CONCLUSION

It is submitted that the present application is presently in form for allowance. Such action is respectfully requested.

Respectfully submitted,

By 

A. Richard Park
Registration No. 41,241

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A. Richard Park
PARK, VAUGHAN & FLEMING LLP
2820 Fifth Street
Davis, CA 95616
Tel: (530) 759-1661
FAX: (530) 759-1665
richard@parklegal.com